Candidate Name Interview Date

Interviewer Score

Problem 01

A palindrome is a word or sequence of characters which reads the same backward or forward. For example the words: level, anna, noon, rotator are all palindromes. Write a function palindrom that accepts a string as an argument and returns a boolean indicating whether the input is a palindrome or not, for example:

palindrome("anna") # returns True

palindrome("apple") # returns False

Problem 02

Write the Linux command needed to change a file name from original.txt to changed.txt

mv palindrome.ts palindrome.js

Problem 03

Given a string containing characters (a-z), implement a function runLengthEncode that compresses repeated ‘runs’ of the same character by storing the length of that run, and provide a function runLengthDecode to reverse the compression. The output can be anything, as long as you can recreate the input with it.

For example:

runLengthEncode("aaaaaaaaaabbbaxxxxyyyzyx") # returns "a10b3a1x4y3z1y1x1" runLengthDecode("a10b3a1x4y3z1y1x1") # returns "aaaaaaaaaabbbaxxxxyyyzyx"

Problem 04

Let f and g be two one-argument functions. The composition f after g is defined to be the function . Define a function compose that implements composition. For

x ↦ f(g(x))

example, if inc is a function that adds 1 to its argument, and square is a function that squares its argument, then:

h = compose(square, inc) # create a new function h by composing inc and square h(6) # returns 49

Problem 05

Write a function unique that takes an array of strings as input and returns an array of the unique entries in the input, for example:

unique(['apples', 'oranges', 'flowers', 'apples']) # returns ['oranges', 'flowers']

unique(['apples', 'apples']) # returns []

Problem 06

A AT

In linear algebra, the transpose of a matrix is another matrix created by writing the A AT

rows of as the columns of , for example:

[a11 a12

T

= [a11 b21

b21 b22]

a12 b22]

Write a function transpose that transposes a matrix, for example:

transpose( [ [1,2], [3,4] ] ) # returns [ [1,3], [2,4] ]

transpose( [ [1,2,3,4], [5,6,7,8] ] ) # returns [ [1,5], [2,6], [3,7], [4,8] ]

Problem 07

You are given 2 containers: A and B. Container A can hold 5 litres of water, while container B can hold 3 litres. You are also given a source of water that you can use as you wish. Show how you can use the containers and the water source to put exactly 4 litres of water in container A. No coding required, just write down the steps.

4

Litres

**Container**

**A**

Problem 08

5

Litres

**Container A**

3

Litres

**Container B**

Given an integer array of length n, find the index of the first duplicate element in the array and state the runtime and space complexity of your implementation, for example:

# returns 3, assuming the index starts with 0

index\_of\_first\_duplicate( [ 5, 17, 3, 17, 4, -1 ] )

Problem 09

Given the below tree structure, write a function sum that accepts a node and returns the sum of integers for the whole tree represented by the given node argument

struct Node {

value: Integer,

children: [Node] # array of nodes

}